

WHAT IS CLAIMED IS:

1 1. A method of detecting an open circuit
2 condition in an electrical system for power supply from
3 a central generator and distributed power generator to a
4 load, the method comprising:

5 injecting a signal into the system;
6 determining a system impedance in response to
7 the injected signal;

8 comparing the determined system impedance with
9 a predetermined threshold; and

10 identifying an occurrence of an open circuit or
11 abnormal condition based on the comparison.

1 2. The method of claim 1, wherein the signal
2 is injected on one phase of the supplied power.

1 3. The method of claim 1, wherein the signal
2 is injected on multiple phases of the supplied power.

1 4. The method of claim 2 wherein the signal
2 is injected on each phase of the supplied power with a
3 different phase angle for each phase.

1 5. The method of claim 1 wherein injecting a
2 signal comprises injecting a fundamental power-frequency
3 voltage to produce a real power flow.

1 6. The method of claim 5 wherein the injected
2 signal comprises harmonics of the fundamental power-
3 frequency.

1 7. The method of claim 1, wherein the
2 injected signal comprises harmonics not harmonically

3 related to the fundamental power frequency.

1 8. The method of claim 1 wherein injecting a
2 signal comprises injecting a fundamental power-frequency
3 voltage to produce a reactive power flow.

1 9. The method of claim 1 wherein comparing
2 the determined impedance comprises comparing an impedance
3 magnitude with a threshold value.

1 10. The method of claim 1 wherein comparing
2 the determined impedance comprises comparing an impedance
3 angle with a threshold value.

1 11. The method of claim 1 wherein the signal
2 is intermittently injected.

1 12. The method of claim 1 wherein the signal
2 is injected at a point relative to a signal waveform to
3 minimize interference, distortion, or saturation.

1 13. A system for detecting an open circuit
2 condition in an electrical power supply system
3 comprising:

4 a central power generator arranged to generate
5 electrical power;

6 at least one distributed power generator
7 arranged to operate as a local source of electrical power
8 for a localized load;

9 a feeder network coupled to the central power
10 generator and the at least one distributed power
11 generator for providing electrical power to the at least
12 one distributed power generator;

13 a signal injector connected to the power supply

14 system and arranged to inject a signal at each phase of
15 the generated power;
16 an impedance calculator connected to the power
17 supply system and arranged to determine the system
18 impedance resulting from the injected signal;
19 a comparator arranged to compare the determined
20 system impedance with a predetermined threshold; and
21 a controller arranged to identify the
22 occurrence of an islanding condition based on the
23 comparison made by the comparator.

1 14. The system of claim 13 wherein the signal
2 injector is arranged to inject a signal comprising a
3 fundamental power-frequency voltage to produce a real
4 power flow.

1 15. The system of claim 13 wherein the signal
2 injector is arranged to inject the signal with different
3 phase angles for each phase of the generated power.

1 16. The system of claim 13 wherein the signal
2 injector is arranged to inject a signal comprising a
3 fundamental power-frequency voltage to produce a reactive
4 power flow.

1 17. The system of claim 13 wherein the
2 comparator is arranged to compare the calculated
3 impedance magnitude with a threshold value.

1 18. The system of claim 13 wherein the
2 comparator is arranged to compare the calculated
3 impedance angle with a threshold value.

1 19. The system of claim 13 wherein the

- 2 controller is responsive to the comparator to disconnect
- 3 the at least one distributed power generator from the
- 4 feeder network if the comparison is indicative of an
- 5 impedance greater than the threshold.

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